Avery Weigh-Tronix

# ZG310

## Thermal Printer

# User Instructions

*AWT 35-500729 Issue AA July 2011*

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# 1 General Information and Warnings

## 1.1 About this Manual

This manual consists of user instructions to be used as a guide for printer installation and operation. Be sure to read all instructions before making any connections.

The manual is divided into chapters by the chapter number and the large text at the top of a page. Subsections are labeled as shown by the 1 and 1.1 headings shown above. The manual name and page numbers appear at the bottom of the pages.

## 1.2 Special Messages

Examples of special messages you will see in this manual are defined below. The signal words have specific meanings to alert you to additional information or the relative level of hazard.

***ELECTRICAL WARNING!***
***THIS IS AN ELECTRICAL WARNING SYMBOL.***
***ELECTRICAL WARNINGS MEAN THAT FAILURE TO FOLLOW SPECIFIC PRACTICES OR PROCEDURES MAY RESULT IN ELECTROCUTION, ARC BURNS, EXPLOSIONS OR OTHER HAZARDS THAT MAY CAUSE INJURY OR DEATH.***

***CAUTION!***
***This is a Caution symbol.***
***Cautions give information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.***

*NOTE: This is a Note symbol. Notes give additional and important information, hints and tips that help you to use your product.*

## 1.3 Electrical Installation

***CAUTION: The power cable must be connected to an earth-grounded electrical outlet. The electrical supply must have a circuit breaker with an appropriate rating to protect from over-current conditions.***

***IF IN DOUBT SEEK ADVICE FROM A QUALIFIED ELECTRICIAN.***

## 1.4 Pluggable Equipment

Pluggable equipment must be installed near an easily accessible socket outlet.

## 1.5 Wet Conditions

***The Model ZG310 printer is not a washdown unit. Do not install near water!***

## 1.6 Routine Maintenance

Always turn off the ZG310 and isolate from the power supply before starting any routine maintenance to avoid the possibility of electric shock.

Make sure that it is placed securely on a flat and level surface.

## 1.7 Installation

***DANGER: RISK OF ELECTRICAL SHOCK. NO USER SERVICEABLE PARTS. REFER TO QUALIFIED SERVICE PERSONNEL FOR SERVICE.***

## 1.8 Power Supply Details

The ZG310 is directly powered through the power jack at the rear of the printer.

The printer is designed for direct connection to a +12V or +24V vehicle battery.

Alternatively, the user may make their own power supply arrangements as described below.

### 1.8.1 Alternative Power Supply Arrangements

The ZG310 is designed to be operated from a 9V to 36V voltage source that is capable of supplying the primary power for the printer.

The electrical specification for the power supply input of the ZG310 printer is:

| | | |
|---|---|---|
| Input Voltage Range: | +9V to +36V | internal over voltage at 37V and reversal protection |
| | | |
| Supply Current Requirement: | 50mA | Printer in Idle Mode |
| ( typical @24V in ) | 1A average | Printer Printing |
| | 4A peak | Printer Printing |

The average and peak current requirements can be adjusted by firmware control codes. See the Service Manual for details.

The recommended power supply input is either a 12V or 24V vehicle battery, this allows the printer to perform at its best. However, the printer will automatically accommodate any DC input voltage in the range 9V to 36V. In addition, power supplies with lower current capacities may be accommodated by varying the internal Power Save parameter. See the Service Manual or contact the factory for more details.

The recommended power supply input is either a 12V or 24V vehicle battery, this allows the printer to perform at its best. However, the printer will automatically accommodate any DC input voltage in the range 9V to 36V.

## 1.9 Printer Firmware Revisions

The manufacturer reserves the right to modify and improve the firmware in its printer products at any time. Every effort is made to ensure backward compatibility, however, no guarantee in this respect is given or implied.

The ZG310 includes a flash-reprogrammable microcontroller. This allows firmware upgrades under customer control (including customized fonts, which may be created using the Font Editor Utility). Refer to the factory for more information in this feature, if required.

## 1.10 Copyright Notice and Disclaimer

Copyright subsists in the manufacturer's intellectual property, including controller firmware (embedded software) and circuit diagrams, pin connection lists and application data. No warranty in respect of patent rights of the manufacturer or of third parties is given. Unauthorized reproduction or amendment of controller firmware may result in prosecution.

Fujitsu is a registered mark of its owner Fujitsu Limited. References to this or other owners' marks in this document are for illustrative purposes only.

The manufacturer does not assume responsibility for interchangeable functionality of other parties' command sets.

## 1.11 EMC Caution

System EMC compliance remains the responsibility of the system designer. It is recommended that screened cables are used; earthing arrangements will depend on the application.

# 2 Getting Started

## 2.1 Connections and EMC Precautions

### 2.1.1 Connector Details

Two user connectors are provided as shown below:

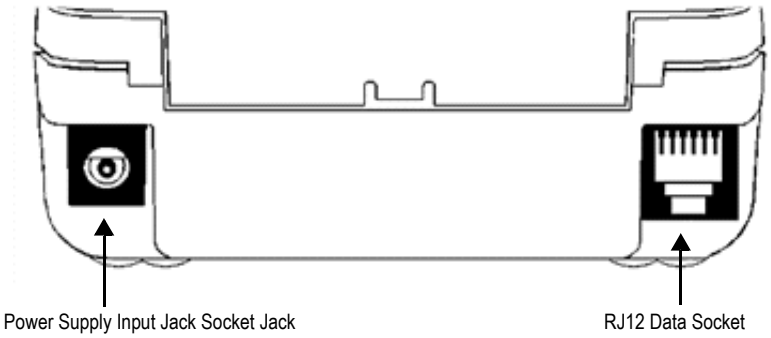


**Figure 2.1 Connector view from rear of printer.**

### 2.1.2 Connector Pinouts

**PSU Jack Socket Detail**

| Pin | Dimension (mm) | Function |
|---|---|---|
| Inner | Inside Ø 2.1 | Positive 9-36 VDC Input |
| Outer | Outside Ø 5.5 | Negative / 0V Common |

The maximum insertion length is 12 mm.

**RJ12 Combined Data Socket Detail:**

| RJ12 Pin | Input / Output | ZG310 Function |
|---|---|---|
| 1 | i/p | No Connection |
| 2 | i/p | Wake-up Input (Only when optional sleep mode is enabled) |
| 3 | i/p | RS-232 Rx data |
| 4 | o/p | RS-232 Tx data |
| 5 | o/p | RS-232 Busy |
| 6 | --- | 0V Common (RS-232 signal return) |

**RS232 Data Cable Configuration (9 pin):**

| D-9 Pin | Name | Function (refers to PC) | ZG310 Pin |
|---|---|---|---|
| 3 | TxD | Serial Data Output | 3 |
| 2 | RxD | Serial Data Input | 4 |
| 6 & 8 | CTS & DSR | Busy Input | 5 |
| 5 | SGND | Signal Common 0V | 6 |

## 2.2 Connecting to a PC

1. Make hardware connections.

1a. Be sure the PC has a D-type serial connector; otherwise, a serial to USB converter will need to be used.

2. Use any of the available serial ports of the ZG310.

3. Make sure that the power supply is switched on and connected. The LED indicator should light; if it does not, check the power supply and connections.

4. Load paper and then press the feed button to check that paper feeds. Press the paper feed button again twice in quick succession (like double-clicking a PC mouse) and the printer should print a self-test message. This will show that the printer is operational, and also reports the way in which the printer's serial data interface is configured.

5. Set up the computer's serial port to match the printer

5a. Your proposed application program may have a way of doing this, or you can get to the DOS prompt [eg C:\>] and type the following command line (assuming you have connected the printer to COM1:):

MODE COM1:9600,N,8,1 [ENTER]

5b. This will set up the port (COM1:) to 9600 baud, No parity, 8 data bits, and 1 stop bits which is the default setting for the ZG310.

6. Send some data to the printer from your computer. An easy way to do this from the DOS prompt is to type:

DIR >COM1: [ENTER]

6a. This should send a directory listing to the printer. The lines will probably overflow, but it will at least show that the communication between the computer and the printer is working.

6b. You can also send data from QBASIC, for example:

```
OPEN "COM1:9600,N,8,1" FOR RANDOM AS #1

PRINT#1, "Hello"
```

6c. Alternatively, in Windows, use the terminal (Hyper terminal) program to send some text to the printer.

### 2.2.1 Application Program

Once communications between your computer and the printer have been established, you can try driving the printer from your application program.

As referred to in the Programmers Guide, the ZG310 has a control code set based on the EPSON ESCPOS protocol. Many of the commands are as closely compatible as they can be, given the mechanical differences between printers, but if the application program was originally written for another printer, it may need to be modified.

# 3 Modes of Operation

The ZG310 has two operating modes, when not actually printing:

- Idle Mode: ready to accept data, but no data is in the buffer awaiting printing, and the printer motor is not running;
- Spool Mode: active, but storing data for later printing.

Modes are indicated by different color combinations on the front-panel LED (see page 12).

The ZG310 is supplied configured as permanently powered on whenever the power supply is connected and switched on.

The ZG310 may optionally be supplied with a sleep mode feature. The sleep period is configurable between 1 and 65534 seconds.

## 3.1 Idle Mode

In idle mode, the printer is ready to receive data, which will be printed as soon as complete lines or graphics patterns are decoded. It responds to the paper feed button normally and can also produce a demonstration print (see below).

## 3.2 Spool Mode

In spool mode, data is received and stored, but not printed. This is useful when printing needs to be suppressed during data transfer (for example in mobile radio systems); or when the printer is unable to print because the paper has run out or the lid is open.

The ZG310 will automatically enter spool mode when the paper is out, when the head is up, or if some other error condition occurs, or alternatively by command from the host. Spool mode may be cleared by host command, automatically when the condition is cleared, or by "double-clicking" the feed button.

## 3.3 LED Indications

The LED indicator at the front of the ZG310 has a number of color combinations, which repeat in up to a 4-phase pattern to provide status information (see table below).

In summary:

- If the LED is constant green it indicates that the printer is operating normally.
- Flashing on and off indicates that Spool mode is active and no printing can take place.
- Red warns of a low power supply voltage or other problem.
- No light indicates that the unit is off.

**Table 3.1 LED Pattern Table**

| Pattern | Power Status | Buffer Mode |
|---|---|---|
| Constant Green | OK | Normal |
| Fast Flashing Green | OK | Spool * |
| Long Green - Short Red | Low Voltage | Normal |
| Short Green - Short Red | Low Voltage | Spool * |
| Fast Flashing Red | Error Condition | Spool<br>(Printing prohibited) |
| No light | Printer is off | |

** (Spool may have resulted from Paper Out or Head Up conditions)*

Although this table may seem complicated, few applications will produce many of the combinations.

# 4 Paper

Pressing the paper feed button when the printer is idle, or in spool mode, advances paper at typically 50 mm per second. However, the feed button has additional functions:

Double-clicking the button (i.e. pressing and releasing twice in quick succession just like a PC mouse):

- in idle mode, prints a demo/test message including the firmware version, encoded calibration data, and the full character set;
- in spool mode, or having been out of paper, prints any stored data and enters idle mode.

Some of the functions of the paper feed button can be invoked or disabled under control of the host.

## 4.1 Loading Paper

Paper rolls must be 57.5 ± 0.5 mm wide, 55 mm maximum diameter, and have the thermally sensitive coating on the outside. The printer can accept rolls which are coreless or wound on a core.

**To load a new roll of paper:**

1. Slide the lid release button forwards until the lid springs open.
2. Unwind a small amount of paper from the roll and insert the paper roll into the printer.
3. Close lid and the paper is loaded.

After loading, check that the paper is straight and advances properly, and tear off any excess by pulling the paper sharply towards you across the serrated tear bar. In the event of a jam or other paper loading problem, release the lid and straighten the paper before closing again.

## 4.2 Paper Out and Head Up Sensors

A reflective optical Paper Out sensor within the mechanism detects an out-of-paper condition, and/or senses black marks to register with pre-printed forms. A mechanical Head Up sensor detects when the lid is open.

By default, the printer enters spool mode automatically if either sensor becomes active. spool mode is automatically exited, and any stored data printed, when new paper is loaded and the lid closed. This behavior may be modified. Please refer to the Service Manual for details of how to configure these functions.

# 5 Printer Operation and Programming

The ZG310 utilizes a Fujitsu FTP-628MCL103 printer mechanism, with a fixed (parallel) print head with 384 horizontally-arranged thermal elements. The paper is advanced by a stepper motor, and printing takes place in a single dot row for each step of the paper. Each printed dot is approximately 1/8 mm square. The printing speed and dot density are controlled according to the power supply voltage and the head temperature.

Various printing modes, including graphics, are invoked by Escape sequences. Control codes and status report protocols are described in detail in the Service Manual which is provided separately.

## 5.1 Data Buffer

The ZG310 has a nominal 20k byte buffer to optimize throughput which enables data to be received into the buffer while previous lines are being printed. Printing will be initiated on receipt of a valid logical line of data or a complete graphics pattern.

The buffer may be cleared by data command or by a hardware reset. A partially full line will be printed on receipt of an appropriate control code, or after a programmable timeout delay.

## 5.2 Spool Mode

Spool mode can be entered by one of the following:

- a command from the host
- a paper out condition or head up condition being sensed.
- an error condition (e.g. head over temperature, over voltage, etc).

In spool mode, the buffered data are stored without being printed until the mode is exited by:

- a command from the host.
- a causing condition (e.g. Paper Out or Head Up) being cleared.
- the paper feed button being double-clicked.

## 5.3 Character Printing and Fonts

The default 32-column character set is formed from a 24x10 dot matrix, and is based on the industry standard IBM® character set Code. This character set has been modified to include the Euro symbol ('€') at position 80H (128 Decimal), in place of the usual capital C with cedilla ('Ç').

Various combinations of single or double width, single or double height, inverted, underlined, and other attributes may be mixed within a line.

Customized fonts may be created using the Font Editor Utility, and downloaded to the ZG310. Only a single custom font may be loaded in the printer at one time, and having a custom font installed prevents the internal fonts from being accessed. Depending on the attributes of the custom font, graphics operations may be affected.

## 5.4 Graphics Printing and Other Programming Modes

Various dot-addressable graphics modes are supported, at up to 384 dots per line. Refer to the Service Manual for full details of this and other advanced programming modes.

## 5.5 Interface Details

### 5.5.1 RS-232 Serial Interface

The ZG310 printer has an industry standard RS-232 interface. The default parameters are 9600 baud, 8 data bits, 1 stop bit and no parity. Other baud rates can be programmed by control codes, or by using a setup utility available from the factory.

Serial data is expected in standard RS-232 format with -12V meaning mark or 1 and +12V a logical 0, with reference to the common ground. The serial data output line, TxD, transmits XON/XOFF and status information to the host at the same baud rate and in the same format as the serial data input.

The hardware busy line is true (nominal -12V) when busy. Both serial output lines will relax to approximately 0V when the ZG310 is off, and the user must allow a short period after switching on before relying on the values of these signals.

Some host equipment uses a constant space condition (+12V) to indicate a reset condition or wait state. Some battery powered host equipment present the same output signal when they go to sleep. The ZG310 can be set to ignore this condition as detailed in the Service Manual, but even then this type of host behavior may result in one or more spurious characters being received and printed.

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